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ABSTRACT

The paper describes a study of the scope of geography achievement tests and the social studies components of national achievement tests. The research examined whether the tests' items were (1) directed primarily toward testing knowledge at the recall/memory level, and (2) comprehensive in their treatment of the discipline. Ten tests were analyzed, including the Hollingsworth-Sanders Geography Test, Iowa Test of Basic Skills (ITBS, Form 6, Social Studies), Michigan Elementary Geography Test, and NCGE Intermediate Level Geography Test (Draft 2, Parts I, II, III). Using Bloom's Taxonomy, items were classified by cognitive level as testing knowledge (memory), comprehension, application, analysis, synthesis, or evaluation. All classifications except knowledge (memory) were considered to be of a high cognitive level. Content was categorized as geographic skills, human geography, physical geography, or miscellaneous. Results showed that the majority of tests provided a balance between lower and higher cognitive questions. However, the Hollingsworth-Sanders contained no higher order questions and the ITBS contained no recall/memory items. Most tests emphasized interpretation of maps, graphs, and charts. Only three tests included questions from 60% or more of the content categories included in the analysis. The NCGE Intermediate Geography Test contained the most even spread of test items across content categories. (Author/AV)

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AN INITIAL ANALYSIS OF CONTENT AND COGNITIVE LEVEL OF QUESTIONS APPEARING ON INTERMEDIATE LEVEL TESTS OF GEOGRAPHIC KNOWLEDGE AND SKILLS

U S DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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Over the past several years many authors have stated that achievement tests in general and the social studies/geography sections of those tests in particular, are not designed to measure intended instructional outcomes. Most often these tests have been cited as being limited in scope and primarily directed toward testing of knowledge at the recall/memory level. In view of the fact that there is a paucity of literature directed specifically at geography achievement tests or geographic questions contained in the social studies components of national achievement tests, this author felt it appropriate to carry out an initial analysis of such test items.

Research Questions

This research effort was designed to answer two main questions:

1) Are test items contained in geographic achievement tests or the social studies components of national achievement tests directed primarily toward the testing of knowledge at the recall/memory level?

2) Are test items contained in geographic achievement tests or the social studies components of national achievement tests comprehensive in their treatment of the discipline?

Procedure

In brief, the procedure used to gain tentative answers to these questions involved devising comprehensive set of categories, representative of the content of geography, by which test items would be classified and the use of Bloom's Taxonomy to classify test items by cognitive level.

The categories by which test items were classified according to content was devised after a thorough review of the recently published work by Manson and Vuicich[1] as well the contents of major elementary social studies text

[1]Gary Manson and George Vuicich, Toward Geographic Literacy: Objectives for Geographic Education in the Elementary School, (Boulder: ERIC/ChESS and SSEC, 1974.

series. An attempt was made to incorporate content found in these materials as well as to develop categories which were both somewhat detailed and mutually exclusive. The categorization system finally arrived at is represented in Table I. While the procedure used to develop the categories and even the categories themselves are subject to some question, it is the belief of the author that they are useful for an initial analysis.

TABLE I

TEST ITEM CLASSIFICATION CATEGORIES

A. Geographic Skills

1. Recognition and interpretation of scale, distance, direction and symbols on maps
2. Recognition and interpretation of scale, distance, direction and symbols on globes
3. Recognition and interpretation of graphs and charts
4. Interpretation of photographs and sketches
5. Interpretation of written material
6. Knowledge of terminology related to latitude and longitude and use of grid systems to determine distance, direction, location, and time
7. Recognition and use of generic geographic terminology
8. Identification and location of specific physical and cultural features (place names)
9. Recognition of accuracy and distortion in maps

B. Human Geography

1. Knowledge of areal association and spatial relationships of land uses
2. Knowledge of cultural patterns and processes
3. Knowledge of association of cultural patterns and/or economic endeavors with political-cultural and/or physical regions
4. Knowledge of the economic and/or political implications of spatial distribution and location of phenomena
5. Recognition and use of terminology specifically related to human geography

C. Physical Geography

1. Knowledge of physical processes, i.e., erosion, aggradation, etc.
2. Knowledge of earth-sun relations, including motion, position, time, and seasons
3. Knowledge of spatial distribution and areal association of climatic, vegetative, and geomorphologic phenomena
4. Recognition and use of terminology specifically related to physical geography
5. Knowledge of the size and shape of the earth

M. Miscellaneous items

NG. Non-geographic items

Classification of items by cognitive level was performed through the use of Bloom's Taxonomy as represented in Table II. A decision was made to classify the items as either lower cognitive level (recall/memory) or higher cognitive level (comprehension through evaluation).

TABLE II

TAXONOMY OF EDUCATIONAL OBJECTIVES: COGNITIVE DOMAIN

I. Knowledge (Memory)	Ability to recall, to bring to mind appropriate material.
II. Comprehension	Ability to know what is being communicated and to be able to make some use of the materials or ideas contained in it.
III. Application	Ability to use ideas, principles, and generalizations in new situations.
IV. Analysis	Ability to identify the component parts of an idea and to establish the logical relationships of the parts of the whole.
V. Synthesis	Ability to draw on elements from many sources and put these together into a structure not clearly there previously.
VI. Evaluation	Ability to make a judgment about the value, for some purpose, of ideas or procedures, solutions, methods, materials.

Selection of tests to be analyzed was made on two bases: 1) tests were either strictly devoted to assessing geographic knowledge at the intermediate level (grades 5-8/9), or 2) tests were widely used national achievement batteries for the intermediate level which contained social studies components. Tests selected are representative of those available, but no attempt was made at inclusion of all such tests. References to the tests which were analyzed is contained in the Appendix.

Findings

Findings of the study are shown in Table III, IV, and V.

Discussion

In reference to the first research question, the majority of the tests provided a balance of questions between the lower and higher cognitive questions (see Table V, Column 1). The exceptions were the Hollingsworth-Sanders which contained no higher order questions and the Iowa Test of Basic Skills which contained no questions at the recall/memory level.

Because it was found that the majority of tests emphasized interpretation of maps, graphs, and charts; and because by definition those items are higher order questions; it was decided to further analyze the items excluding categories A_1 and A_3. The results indicated that only five of the tests still provided a balance of lower and higher order questions, with the Brandywine and the NCGE Intermediate including a majority of higher order questions (see Table V, Column 2).

In regard to the second research question, it was found that only three tests included questions from 60% or more of the content categories included in the analysis. These were the Map & Globe Skills Diagnostic Test, the Michigan Elementary Geography Test, and the NCGE Intermediate Geography Test (see Table V, Column 3). Of the three which included 60% or more of the content categories, the NCGE Intermediate Geography Test contained the most even spread of test items across the three main content areas: skills, human geography, and physical geography.

Conclusions and Recommendations

In regard to those characteristics desired in achievement tests by professional geographic educators, those tests analyzed in this study deserve

neither total condemnation nor unqualified praise. Further work needs to be done to modify and/or develop tests which are comprehensive in nature and which provide a balance between lower and higher order questions. The NCGE Intermediate Level Geography Test probably represents the best progress toward this goal to date.

TABLE III
CLASSIFICATION OF TEST ITEMS BY CONTENT AND COGNITIVE LEVEL
(Absolute Numbers)

Test Name	# of Items	Cog. Level (Hi / Know)	SKILLS									HUMAN					PHYSICAL					M	NG
			A_1	A_2	A_3	A_4	A_5	A_6	A_7	A_8	A_9	B_1	B_2	B_3	B_4	B_5	C_1	C_2	C_3	C_4	C_5			
Brandywine Achievement Test in Geo. for Sec. Sch. Grades 7-12	62			5			29	2			1						2	2					
								4	1		1							6	7		1	1	
Hollingsworth-Sanders Geo. Test, Test 1, Form A Grades 5-7	65																						
									2	24			2	13	1	4			2	3		14	
Iowa Test of Basic Skills, Form 6, Soc. Studies Grades 4-9	84		59			3		11						3	4			2	2				
Map & Globe Skills Diagnostic Test Grades 3-9	69		22	2				4						1				3	2	2			
			1	6		1		2	2	9	2							7			3		
Metropolitan Achievement Test, Form F Social Studies 5.0 - 6.9	93		11		12																		
				1					4	1			1	3	1	1				11		9	47

CONTENT			SKILLS									HUMAN						PHYSICAL						M		NG
Test Name	# of Items	Cog. Level Hi / Know	A_1	A_2	A_3	A_4	A_5	A_6	A_7	A_8	A_9		B_1	B_2	B_3	B_4	B_5		C_1	C_2	C_3	C_4	C_5				
Metropolitan Achievement Test, Form F Social Studies Grades 7 - 9.5	94	Hi	12		12																					
		Know							1					3	5	2											59
Michigan Elem. Geog. Test Grades 5-8	50	Hi	10		6	6		2					4			1			1	1	1					
		Know							1	8				1		1	1		1		5					
SRA Achievement Test, Form E Social Studies Grades 4-9	40	Hi	8			6																				
		Know			6					1				4	3	1			1		1					9
Stanford Achievement Tests Form A, Soc. Studies Grades 5-8	60	Hi	6		4			1						1	2											
		Know						2		3			1	5	9	1	2			1	1					21
NCGE Intermediate Level Geog. Test Grades 5-8	85	Hi	16		10	4		2		10			4	1	5	3			3		3	4				
		Know							1				3		7						9					11

TABLE IV
CLASSIFICATION OF TEST ITEMS
BY CONTENT AND COGNITIVE LEVEL
(Percentages)

CONTENT			SKILLS										HUMAN						PHYSICAL									
Test Name	# of Items	Cog. Level Hi / Know	A_1	A_2	A_3	A_4	A_5	A_6	A_7	A_8	A_9		B_1	B_2	B_3	B_4	B_5		C_1	C_2	C_3	C_4	C_5		M		NG
Brandywine Achievement Test in Geo. for Sec. Sch. Grades 7-12	62			8.06			46.8	3.23			1.61								3.23	3.23							
								6.45	1.61		1.61									9.68	11.3		1.61		1.61		
Hollingsworth-Sanders Geo. Test, Test 1, Form A Grades 5-7	65																										
								3.08	36.9					3.08	20.0	1.54	6.15				3.08	4.62			21.5		
Iowa Test of Basic Skills, Form 6, Soc. Studies Grades 4-9	84		70.2			3.57		13.1							5.57	4.76				2.38	2.38						
Map & Globe Skills Diagnostic Test Grades 3-9	69		31.9	2.90				5.80							1.45					4.35	2.90	2.90					
			1.45	8.70		1.45		2.90	2.90	13.0	2.90									10.1			4.35				
Metropolitan Achievement Test, Form F Social Studies 5.0 - 6.9	93		11.8		12.9																						
				1.08					4.30	1.08				1.08	3.23	1.08	1.08					11.8					50.5

CONTENT			SKILLS									HUMAN						PHYSICAL						M		NG
Test Name	# of Items	Cog. Level Hi Know	A_1	A_2	A_3	A_4	A_5	A_6	A_7	A_8	A_9		B_1	B_2	B_3	B_4	B_5		C_1	C_2	C_3	C_4	C_5				
Metropolitan Achievement Test, Form F Social Studies Grades 7-9.5	94		12.8		12.8				1.06					3.19	5.32	2.13										62.8
Michigan Elem. Geog. Test Grades 5-8	50		20.0		12.0	12.0		4.00	2.00	16.0			8.00	2.00		2.00	2.00		2.00	2.00	2.00						
SRA Achievement Test, Form E Social Studies Grades 4-9	40		20.0		15.0	15.0				2.50				10.0	7.50	2.50			2.50		2.50						22.5
Stanford Achievement Tests Form A, Soc. Studies Grades 5-8	60		10.0		6.67			1.67						1.67	3.33												35.0
								3.33		5.00			1.67	8.33	15.0	1.67	5.33			1.67	1.67						
NCGE Intermediate Level Geog. Test Grades 5-8	85		18.8		11.8	4.7		2.35	1.18	11.8			4.7	1.18	5.88	3.53			3.53		3.53	4.7					
													3.53		8.24						10.59						

TABLE V

CLASSIFICATION OF TEST ITEMS: SUMMARY TABLE

Test Name	Cog. Level % Lo	Cog. Level % High	Cog. Level w/o A_1 & A_3 (%) Lo	Cog. Level w/o A_1 & A_3 (%) High	Categories Represented %	Questions from Area A (%)	Questions from Area B (%)	Questions from Area C (%)	Misc. %
Brandywine Achievement Test	33.87	66.13	33.87	66.13	50.0%	69.35	---	29.03	1.61
Hollingsworth-Sanders Geo. Test	100.00	0	100.00	0	45.0%	40.00	30.77	7.69	21.54
Iowa Test of Basic Skills	0	100.00	0	100.00	35.0%	86.90	8.33	4.76	---
Map & Globe Skills Diagnostic Test	47.83	52.17	70.21	29.79	60.0%	73.90	1.45	24.64	---
Metropolitan Achievement Test 5.0-6.9	50.00	50.00	100.00	0	50.0%	63.04	13.04	23.91	---
Metropolitan Achievement Test 7-9.5	31.43	68.57	100.00	0	30.0%	71.43	28.57	---	---
Michigan Elem. Geog. Test	36.00	64.00	52.94	47.06	65.0%	66.00	16.00	18.00	---
SRA Achievement Test	54.84	45.16	73.91	26.09	45.0%	67.74	25.81	6.45	---
Stanford Achievement Test	64.10	35.90	86.21	13.79	55.0%	41.03	53.85	5.13	---
NCGE Inter. Level Geog. Test	23.53	76.47	33.90	66.10	65.0%	50.59	27.06	22.35	---

APPENDIX

NAME	GRADE LEVEL	AVAILABILITY
Brandywine Achievement Test in Geography for Secondary Schools, Form A, Parts I and II	7-12	Coatesville, Pa.: Brandywine Ach. Test, 1962.
Hollingsworth-Sanders Geography Test	5-7	Emporia, Kansas: Emporia State University, 1964.
Iowa Test of Basic Skills, Form 6, Social Studies	4-9	Geneva, Illinois: Houghton-Mifflin, 1971.
Map and Globe Skills Diagnostic Test	3-9	Chicago: A.J. Nystrom, 1974.
Metropolitan Achievement Test	5.0-6.9	New York: Harcourt, Brace, and Jovanovich, 1970.
Metropolitan Achievement Test, Form F, Social Studies	7.0-9.5	New York: Harcourt, Brace, and Jovanovich, 1970.
Michigan Elementary Geography Test	5-8	Lansing: Dept. of Geography, Michigan State University, 1974.
SRA Achievement Series, Form E, Social Studies	4-9	Chicago: SRA, 1971
Stanford Achievement Test, Form A, Social Studies	5-8	New York: Harcourt, Brace, and Jovanovich, 1972.
NCGE Intermediate Level Geography Test, Draft 2, Parts I, II, III	5-8	Houston: NCGE, 1978.